



FORM PTO-1500 (REV 11-98)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER 2019.000500
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			U.S. APPLICATION NO. (PCT/US 98/0102) <b>09/3677761</b>
INTERNATIONAL APPLICATION NO. PCT/NL98/00102		INTERNATIONAL FILING DATE 20 February 1998	PRIORITY DATE CLAIMED 24 February 1997
TITLE OF INVENTION ANCHOR AND METHOD OF UNCOUPLING FOR SUCH ANCHOR			
APPLICANT(S) FOR DO/EO/US Gijbertus Degenkamp			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).</p> <p>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19<sup>th</sup> month from the earliest claimed priority date.</p> <p>5. <input type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p style="margin-left: 20px;">a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</p> <p style="margin-left: 20px;">b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau.</p> <p style="margin-left: 20px;">c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</p> <p>7. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p style="margin-left: 20px;">a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> have been transmitted by the International Bureau.</p> <p style="margin-left: 20px;">c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p style="margin-left: 20px;">d. <input type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p><b>Items 11. to 16. below concern document(s) or information included:</b></p> <p>11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input type="checkbox"/> A FIRST preliminary amendment. A SECOND or SUBSEQUENT preliminary amendment.</p> <p>14. <input type="checkbox"/> A substitute specification.</p> <p>15. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>16. <input type="checkbox"/> Other items or information. A copy of the International Application as filed with the International Search Report, Verified Statement Claiming Small Entity; Return Postcard.</p>			

U.S. APPLICATION NO. (if known) <b>09/367761</b>	INTERNATIONAL APPLICATION NO. PCT/NL98/00102	ATTORNEY'S DOCKET NUMBER 2019.000500
<b>17. <input checked="" type="checkbox"/> The following fees are submitted:</b> <b>BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):</b> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO . . . . . <b>\$970.00</b>  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO . . . . . <b>\$840.00</b>  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO . . . . . <b>\$760.00</b>  International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provision of PCT Article 33(1)-(4) . . . . . <b>\$670.00</b>  International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) . . . . . <b>\$96.00</b>		<b>CALCULATIONS PTO USE ONLY</b>
<b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>		<b>\$840.00</b>
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492(e)).		<b>\$00.00</b>
<b>CLAIMS</b>	<b>NUMBER FILED</b>	<b>NUMBER EXTRA</b>
Total claims	35 -20 =	15
Independent claims	9 -3 =	6
<b>MULTIPLE DEPENDENT CLAIM(S) (if applicable)</b>		<b>+ \$260.00</b>
<b>TOTAL OF ABOVE CALCULATIONS =</b>		<b>\$1820.00</b>
Reduction of 1/2 for filing by small entity, if applicable. A Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28).		<b>&lt;\$1699.00&gt;</b>
<b>SUBTOTAL =</b>		<b>\$1699.00</b>
Processing fee of <b>\$130.00</b> for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492(f)).		<b>\$00.00</b>
<b>TOTAL NATIONAL FEE =</b>		<b>\$1699.00</b>
Fee for recording the enclosed assignment (37 CFR 1.21(b)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). <b>\$40.00</b> per property		<b>\$40.00</b>
<b>TOTAL FEES ENCLOSED =</b>		<b>\$1739.00</b>
		<b>Amount to be: refunded charged \$ \$</b>
<b>a. <input checked="" type="checkbox"/> A check in the amount of \$1739.00 to cover the above fees is enclosed.</b>  <b>b. <input type="checkbox"/> Please charge my Deposit Account No. 50-0786 in the amount of \$_____ to cover the above fees. A duplicate copy of this sheet is enclosed.</b>  <b>c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 50-0786/2019.000500/TDM. A duplicate copy of this sheet is enclosed.</b>		<b>EXPRESS MAIL RECEIPT</b>  <b>NUMBER: EL456298731US</b> <b>DATE OF DEPOSIT: 8/19/99</b>  I hereby certify that this paper or fee is being deposited with the United States Postal Service/ EXPRESS MAIL POST OFFICE TO ADDRESSEE service under 37 C.F.R. 1.10 on the date indicated above and is addressed to: Assistant Commissioner for Patents, Washington, DC 20234.  <i>Deek Herman</i> Signature
<b>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.</b>		
<b>SEND ALL CORRESPONDENCE TO:</b>		
<b>WILLIAMS, MORGAN &amp; AMERSON, P.C.</b> 7676 Hillmont, Suite 250 Houston, Texas 77040- (713) 934-4050		<i>Terry D. Morgan</i> SIGNATURE  Terry D. Morgan PRINTED NAME  31181 REGISTRATION NUMBER

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS  
(37 CFR §§ 1.9(F) AND 1.27(C)) - SMALL BUSINESS CONCERN**

I hereby declare that I am

- ☐ the owner of the small business concern identified below:  
☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN: VRIJHOF ANKERS BEHEER B.V.  
ADDRESS OF SMALL BUSINESS CONCERN: Meerkoetstraat 83a – 2990 KRIMPEN A/D IJssel  
The Netherlands

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR § 121.3-18, and reproduced in 37 CFR § 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled ANCHOR AND METHOD OF UNCOUPLING FOR SUCH ANCHOR by inventor(s) described in

- ☐ the specification filed herewith  
☒ application serial no.: PCT/NL98/00102 filed: February 20, 1998  
☐ patent no.: issued:

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below\* and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 CFR § 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR § 1.9(d), or a nonprofit organization under 37 CFR § 1.9(e).

\*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR § 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR § 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Signature: 

Name: DEGENKAMP, Gijsbertus

Title: Managing Director

DATE: August 3, 1999

Address of Person Signing:

Oosteinde 21

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ANCHOR AND METHOD OF UNCOUPLING FOR SUCH ANCHOR

The invention relates to an anchor with a fluke and a shank, which shank can be rigid or composed of threads, and connected to an anchor line at the upper end.

- 5 Such anchors are used for mooring floating objects with respect to a water bottom, such as semi-submersibles used in the exploration and exploitation of sea-bottoms.

- 10 At installation, the anchors are lowered on the water bottom and then by exerting a pulling force on the anchor line which is connected to the upper end of the shank, pulled in the ground until the anchor is sufficiently far penetrated in there for supplying the required holding power. Said anchor line, up till then used as installation
- 15 line, can, if so desired, be used for connecting the object and the anchor.

- For certain anchoring systems, such as so-called vertical anchoring systems, it is desirable that the mooring or
- 20 load lines exert a force on the fluke which is perpendicular to the fluke as much as possible and oriented through the surface centre of gravity of the fluke. This can be realized by moving the point of engagement of the installation line on the shank to a place further rear-
- 25 wards on the shank, or by swinging the shank in relation to the fluke. Alternatively an extra load line can be made use of, which line is attached to the anchor on the desired place beforehand, for instance on the fluke at the location of its surface centre of gravity. Examples of
- 30 such solutions have been described in applicant's international patent applications PCT/NL92/00144 and PCT/NL93/00257, the contents of which should be considered inserted herein. International patent applications

PCT/GB92/02210 and PCT/GB96/01755 can also be referred to, from which anchors are known of which the angle between the shank and the fluke can be altered. In one embodiment this is realized by having the shank consist of two parts, one part extending obliquely to the fore being connected to the installation line and the other, upright part being connected to a (vertical) load line. By pulling the load line a pin breaks resulting in an uncoupling mechanism for the connection between the oblique shank part and the fluke being released. In another embodiment there is a shank, which, with the help of a removable wedge which is clamped between the shank and the fluke, is initially secured in an oblique position. By pulling an extra pulling line the bolt breaks after which a bar provided with a wedge at its bottom end can be slid upwards along the shank in order to lift the wedge, after which the shank can be turned upright. In yet another embodiment the angle is enlarged by swing-pulling the shank from the installation position to a vertical position with the help of the anchor line, by swing-pulling the shank and having a connection between the shank and the fluke fail therewith.

It can also be desired to retrieve the installation line after having pulled an anchor into the ground, possibly together with the shank. For connecting (the rest) of the anchor with the object, an extra anchor line has then already been attached to the fluke or with the shank (when it remains connected to the fluke). The connection between the installation line and the shank or either the connection between the shank and the fluke can be adapted to that end in order to fail at a certain pulling force. Alternatively the connection shank-fluke can be remotely operable for uncoupling, for instance with an extra pulling line. Examples of anchors which have been adapted to that end have been described in the aforementioned international patent application PCT/NL92/00144.

It can furthermore be desirable to alter the angle between the shank and the fluke in order to be able to pull the anchor, at least the fluke, out of the ground to be able to use the (valuable) anchor again. From the international patent application PCT/NL92/00144 an anchor is known of which the shank is connected to the fluke on two locations spaced apart in longitudinal direction of the fluke, one of the connections being remotely detachable, for instance with an extra pulling line or in an acoustic manner, and the other, preferably foremost connection is a hinge. By releasing the connection mentioned first the fluke will only be connected to the fluke at the location of the hinge connection, wherein the fluke can direct itself in an orientation of the lowest resistance when pulling out the anchor. In one embodiment the connection mentioned first is also adjustable, because of which the angle between the shank and the fluke can be enlarged in order to be able to deploy the anchor in the aforementioned vertical anchoring systems.

For all these conversions it is necessary to have a part fail before the connection concerned can be uncoupled and/or special aids, such as pulling lines, acoustic means and hydraulic means are necessary. In this way, on the one hand, there is the risk that the connection concerned releases at an unforeseen exceeding of the failure limit of the part (long) before such is desired and the anchor has to be hauled in again in order to install it again or that a future possibility of conversion has to be given up. If one would want to avoid this risk -if at all possible- one would have to manoeuvre the anchor very carefully.

On the other hand the aids mentioned make the anchor expensive and prone to damage and therefore sensitive to disturbance regarding the conversion function.

An objective of the invention is to provide an anchor in

which in a simple and reliable way, at the desired moment, one of the types of conversions mentioned, from the installation stage to the user stage or from the user stage to the hauling-in stage, can take place. Furthermore  
5 it is an objective of the invention to provide a method for this.

To that end the invention provides an anchor with a fluke with a longitudinal axis which extends from the rear end  
10 of the fluke to its front end and with connection means for connecting the fluke with the lower end of an anchor line, which connection means comprise an anchor shank, the connection means comprising at least one coupling with two cooperating coupling members, the first of which being  
15 situated on the fluke side of the coupling and being directly or indirectly connected to the fluke in order to follow its movement and the second being situated on the anchor line side of the coupling and being directly or indirectly connected to the anchor line, the anchor  
20 furthermore comprising operation means for the coupling which means are activated by swinging the anchor line held taut in order to change its angle with respect to the longitudinal axis of the fluke and then to mutually displace the first and second coupling member from a coupling  
25 position to a position in which the second coupling member is released or emerges from coupling engagement with the first coupling member, the second coupling member comprising a coupling hook which can be released by means of manipulation of the anchor line.

30 In the anchor according to the invention the connection to be uncoupled can be released in a simple way and only at will by swinging the anchor line, which can either be an installation line or a load line.

35 Preferably the coupling is adapted such, that at a further pulling of that same anchor line, so in a smooth con-



tinuous movement, both coupling members are removed entirely from one another and the parts of the anchor which are connected with them, respectively, are brought at a distance from one another.

5

Preferably the operation means are adapted for having the second coupling member pivoted from the coupling position to the release position. In this way the turning movement of the anchor line can be efficiently used for uncoupling, without complicated transfer mechanisms being necessary.

10

In a further embodiment of this the first coupling member comprises a pin about which a coupling hook engages, the operation means being adapted for having the hook pivoted about an axis, which is parallel to and at a distance from the pin. Such a connection which can be uncoupled is very simple in construction and action and can be applied on different locations in the anchor without complicated additional provisions for it.

15

20

The operation means then preferably comprise a first stopping face which, at least as long as the hook and the pin are coupled to one another, is stationary with respect to the pin as well as a second stopping face on the hook integrated therewith, the first stopping face forming a limitation for the displacement of the second stopping face at pivoting the hook about the pin and therewith forming a fulcrum for the hook.

25

The second stopping face preferably is situated at at the most 180° in circumferential direction of the hook spaced from the end of the hook to facilitate the release from the hook.

30

Preferably the pin is provided with a flattening at the side of the pin which is facing away from the hook opening, to further the last stage of the release.

35

The coupling according to the invention can advantageously be applied to effect an enlargement of the angle between the two portions of the anchor. In that case the connection means comprise a second permanent, latently present connection, between the parts of the anchor connected by both coupling members, which connection extends parallel to the coupling formed by the coupling members, and becomes active after releasing the coupling.

Said connection may be a cable or chain, or a rigid element, which can be extended or folded out.

In the latter case, in case of a hook-shaped second coupling member, this hook may be pivotably though permanently attached to an end of an elongated, rigid intermediate member by means of a second pin, which member is pivotably connected to a part of the anchor which forms a rigid whole with the pin, at the other end by means of a third pin, the pin being situated between the second and the third pivot pin in the coupling position.

In a possible further development of this the intermediate member comprises a longitudinal groove which is concentric with respect to the pin and in which the second pin is able to slide until abutment, the abutment with the second pin subsequently forming a fulcrum for the hook.

In another possible further development the second pin is fixedly connected to the intermediate member and the hook pivots about the second pin at uncoupling.

Further advantageous embodiments of the anchor and the method according to the invention are subject of the claims and of the description of a number of the examples shown in the attached drawings following hereafter.

Shown is in:

Figures 1A-D a first exemplary embodiment of an anchor according to the invention in consecutive stages;

5        Figures 2A-G an exemplary embodiment of a coupling of the anchor according to the invention, in consecutive stages in cross section, as well as an alternative embodiment;

10       Figures 3A-D a shank angle adjustment mechanism which is situated at the upper end of a shank, during consecutive stages;

15       Figures 4A, 4B and 4C an alternative shank angle adjustment mechanism in which the coupling according to the invention is included;

20       Figures 5A-D another exemplary embodiment of the anchor according to the invention, in which the coupling is used to easily haul in the anchor;

25       Figure 6 a detail of a possible embodiment of the coupling in a anchor according to the invention;

30       Figures 7A-C an anchor according to the invention which is provided with various couplings; and

35       Figure 8 another example of the anchor according to the invention.

In the figures 1A-D the anchor 1 comprises a fluke 8, on which fixed points of suspension or supports 9 and 10 have been attached, each of which consisting of two upright plates between which pins 11 and 12, respectively, have been attached. It will be understood that two or more supports 9 and two or more supports 10 are present. Each of these supports forms a point of attachment for the lower ends or sockets of the shank wires 3 and 4, which come together at the top at the location of shackle 5, on

which the lower end of an anchor line 2 has been attached. Hook-shaped attachments 6 and 7 have been applied onto the lower ends of the shank wires 3 and 4 of which attachments the hooks exactly fit the aforementioned pins 11 and 12.

5 In the situation shown in figure 1A the hooks 6 and 7 are confined on the pins 11 and 12, as a result of appropriate design of the hooks and the supports. This will be further gone into in the discussion of the figures 2A-E.

- 10 In figure 1A the position is shown at the final stage of having the anchor 1 penetrate. It is often desired to be able to use the anchor line 2 used for the installation, again. For this anchor line is not always suitable for use during the actual anchoring or is too expensive for that.
- 15 It will then be advantageous if the fluke 8 is attached to the object to be anchored with another anchor line, the load line or mooring line, for instance in a vertical anchoring system such as is discussed in the International patent applications mentioned in the preamble. In these
- 20 figures an attachment for such a load line is not shown, but it will be understood that it will then be present.

- This concerns winning back the installation line 2 in an easy way, with shank wires 3, 4 with it as well. To that
- 25 end the vessel with which the installation line 2 is connected is sailed to the left as seen in the drawing, because of which line 2, while pulling it taut in the direction B, swings in the direction A. As a result the shank wires 4 will slacken and the shank wires 3 remain
- 30 taut. The foremost hooks 6 will pivot in the direction C. At a certain moment (see figures 2A-E) the hook 6 will have been urged off the pin 11 and be released, after which, at continued pulling in the direction B and continued swinging in the direction A the shank wires 4 will
- 35 tauten. At continued swinging in the direction A the same procedure will now follow for the hooks 7 with respect to the pin 12, until the situation shown in figure 1D is

reached and both shank wires 3 and 4 are loose from the fluke 8.

5 In the figures 2A-E it can be seen how the hooks 6 get loose. The hook 6 shown here is still coupled to the support 9 with the pin 11 in figure 1A. As can be seen in the cross section of figure 2F, the support 9 is formed like an upright plate with a hole 16, in which the pin 11 has been inserted. On the hook 6 plates 6a, 6b have been  
10 welded on both sides, which plates serve to make sure that the pin 11 cannot be released. Moreover the plates 6a, 6b ensure a strengthening of the hook 6, so that the pulling forces can be transferred without deformation of the hook during installation.

15 Below the pin 11 there is a bottom 14 (figure 2A), which is circular and has a curve in the portion 14a, the confinement portion, which curve corresponds to one which is concentric with regard to the central axis of the pin 11 and a portion 14b which diverges to the outside with  
20 respect of the confinement portion. At the right hand end the portion 14b merges into a horizontal plane 15, which slopes out of there. The pin 11 is furthermore provided with a bevel 13 at the release side for the hook. At the  
25 upper end the plate 9 is provided with a cam 17, which is situated in a same vertical plane as the cam 19 formed within the hook 6 (not shown in figure 2F). At pivoting in the direction C of the hook 6 the cams 17 and 19 will, as can be seen in figure 2B, abut one another in order to  
30 form a fulcrum 20 for the hook at further pivoting (figure 2C) in C', which fulcrum is at a distance from the central axis of the pin 11. The end 18 of the hook 6, which lies at 180° of the fulcrum 20 (as regarded about pin 11) will then want to come apart from the pin 11, which is made  
35 possible by the spacious curvature of the plane 14b. At further pivoting according to C' the hook-shaped end 18 gets more space as a result of the receded plane 15 and

finally the situation shown in figure 2E is realized, in which the end of the hook as a result of the bevel 13 can move upwards along the pen 11 and away from the support 9. It will be understood that a comparable arrangement can  
5 be applied with the hindmost support 10 on the fluke 8, for the hook 7, which will then be pivoted in the direction D.

10 In figure 2G a simple alternative for the coupling of the figures 2A-G has been shown. The confinement portion 14a is replaced here by confinement cam 14c which is welded to the plate 9. The end 18 can pivot along the cam 14c to the outside when the fulcrum 20 has been realized.

15 In the figures 3A-D a so-called shank angle adjuster 31 has been shown, as for instance described in applicant's International patent application PCT/NL93/00257. By means of socket 40 at the location of the hinge pin 41, the anchor line 32 is permanently attached to one end of an  
20 elongated plate 35, at the other end of which by means of hinge pin 38 a shackle 37 for the hindmost shank wires 34 has been attached. There could be two plates 35, lying next to each other and determining between them a receiving space for a second plate 36, which is hingably  
25 connected with the plate 35 at the location of the hinge pin 38 and is provided with a fixed pin 39 reaching up to the inner surface of the plate 35. At the location of the hinge pin 43 the plate 36 is furthermore connected with shackle 42 for foremost shank wires 33.

30 Special now is that at the lower end the end block 40 is provided with a hook 44, which during installing the anchor, including the shank wires 33, 34, engages the pin 39 as a result of the pulling direction. In this way the  
35 plates 35 and 36 are kept together in a folded state. With the pin 39 the hook 44 forms a locking mechanism here which can be uncoupled.

If the anchor line 32 pulled taut is now pivoted in the direction E, the tension will continue to exist in the foremost shank wires 33 and these will sway along to a more upright position. The plates 35 and 36 will also swing along in a anticlockwise direction. Because of the slackening of the shank wires 34 the anchor line 32 can come in (pulling) line (F) with the foremost shank wires 33. The location of the pin 39 is now such with respect to that pulling line, that the hook 44 has come free from the pin 39, which, for that matter, can be provided with a bevel to advance the moment of release.

Subsequently the plate 36 can tilt about the hinge pin 38 in the direction G to the situation shown in figure 3D, in which the distance between the pivot pin 41 and the shackle 42 has been enlarged and as a result the shank formed by the shank wires 33 and 34 can be arranged at a larger opening angle with respect to the fluke than was the case in the situation in figure 3A.

In the figures 4A and 4B the anchor 51 has been provided with a fluke 58 with foremost supports 59 and hindmost supports 60, which have been provided with pins 61 and 62 respectively, all this in accordance with the anchor of the figures 1A-D. By means of shackle 55 the anchor line 52 is connected to the foremost and hindmost, respectively, shank wires 53, 54, the hindmost shank wires 54 being fixedly though hingably by means of end block or socket 57 through pin 62, connected with support 60 on the fluke 58. The foremost shank wires 53, however, are provided with sockets with hooks 56, which may largely correspond with the hook of the figures 2A-E. The same goes for the support 59: it may correspond with support 9.

Special now is that within the sides, the hook 56 is provided with pin 66 which pin is slidably accommodated in slot 70 which has been made in a buckled elongated plate

65, which at the other end at the location of hinge 68 is connected to the support 67 which is fixed to the fluke 58. In the situation shown in figure 4A the slot 70 runs according to a curve which is concentric to the central axis of the pin 61. The hook 56 is furthermore provided with two joined side plates 56a, b, just like the hook 6 discussed earlier.

When the anchor line 52 is pulled tighter in the direction I and swung in the direction H the hook 56 will pivot along, the pin 66 running to the left in the slot 70. When the pin 66 reaches the end limit 69 of the slot 70 a fulcrum is realized there, which can be compared to fulcrum 20 in the figures 2C-E. With on-going swinging in the direction H the hook 56 is released, but because the pin 66 remains confined in the elongated plate 65 and because of that the hook remaining connected, though indirectly by means of 68, to the fluke 58, the effect will be that the distance along the foremost shank wires 53 between the shackle 55 and the fluke 58 is enlarged, resulting in the shank angle opening to the fore being enlarged. In the case shown in figure 4B the anchor 51 can be used for an anchoring system in which pulling perpendicular to the fluke takes place. Instead of the rigid plates 65 a flexible chain or cable can also be used, which has been connected to the hook and the fluke.

In the figures 5A-D yet another example is shown of an anchor 71, which, at the lower end of the foremost shank wires 73, is provided with a shank angle adjuster 80, 81 and a detachable coupling according to the invention. The hindmost shank wires 74 are permanently though hingably connected to the fluke of the anchor. By swinging the anchor line 72 in the direction J and simultaneously pulling in the direction K, K' the hook 76 is released from the pin 81 of the support 79. This construction is comparable to the one of figures 1A-D and 2A-E or 2G.



In figure 6 a connecting device 90 according to the invention has been shown, which can be found at the upper end of the shank, here consisting of foremost and hindmost shank wires 93, 94, respectively. The device 90 comprises one or more parallel plates 113', to which various shackles for various wires or anchor lines have been attached. At the location of the pivot pin 99, the hindmost shank wires 94 are connected to the device 90 by means of eye 95 en shackle 97 whereas the foremost shank wires 93 have been connected to it by means of eye 96 and shackle 98 with hinge pin 100. Furthermore a (vertical) load line 91 has been connected to the device 90 by means of shackle 103 and pivot pin 104. At the other end the installation line 92 has been connected to the device 90 by means of hook 101 and pin 102. The lower end of the hook 101 is kept confined between the pivot pin 102 and wedge 112. This wedge 112 itself is held confined between shackle 98 and hook 101 and is connected to an operating rod 110, at the location of pivot pin 111 which rod is pivotably connected to lever 107 at the other end at the location of 109, which lever has been pivotably connected to the device 90 by means of pivot pins 108. By means of pivot pin 106 the other end of the lever 107 is connected to protrusion 105, which has integrally been formed with the shackle 103.

After having the anchor penetrated until in the correct position with the help of the installation line 92, one would want to win back the installation line 92 and tighten the load line 91. When the load line 91, which is also to be regarded as an anchor line, is swung in the direction L the pivot pin 106 will pivot along in the direction M and the pivot pin 109 will counter-pivot in the direction N. As a result of this the rod 110 will slide in the direction O, as a result of which the wedge 112 will be pulled out of the space between the shackle 98 and the hook 101, thus providing downward space for the

hook 101. The hook 101 can now become released from the pin 102, for instance by falling downwards or by pulling the line 91 further. The removal can also be promoted by swinging the installation line 92 in the direction P. The installation line 92 can be hauled in after that and the load line 91 be further tightened, also resulting in the position of the pivot pins 99 and 100 being altered and the shank angle being enlarged.

10 In the figures 7A-C the principle according to the invention is applied in multiple ways. The anchor 200, of the so-called Stevpris type, which type is available with applicant, has a fluke 204 and a rigid shank 213 which consists of two similar plates, in which - as is  
15 schematically shown - at half level, a pin is 206 has been attached on both plates, and in which at the upper end the plates are connected to one another by means of pin 205. A hook 211 engages, about the pin 205 which hook has been attached to the anchor line 202, which is used during  
20 installation. At the location of 208 the upper end of the hook 211 however is still connected to two extension parts 203a, 203b of the anchor line 202, which extension parts 203 are each connected to a similar hook 212 at the location of 209. These hooks 212 engage about the respective  
25 pivot pins 206 in the way described above and are confined in lateral direction. The hooks 212 each are connected to further extension parts 204a, b of the anchor line at the location of 209. Finally these extension parts 204a, b are connected to the upper end of the shank 213 at  
30 the location of 210.

When it is desired to use the anchor after installation in anchoring systems in which pulling substantially perpendicular to the upper surface of the fluke has to take  
35 place, the installation line 202 is swung about in the direction Q while exerting pulling forces in the direction R. In the way described before the hook 211 will then,

because of the fact that the anchor 200 is kept in position by the ground, pivot about the pin 205 and be released. Then the situation shown in figure 7B has been reached, in which the anchor line 202, 203a, b has been  
5 connected to the anchor 200 by hook 212 and the pin 206. That situation is the situation of use, in which the anchor line 202 almost coincides with the line X which is perpendicular to the surface of the fluke 214 and goes through its surface centre of gravity.

10

When it is desired to haul in the anchor 200 again, the anchor line 202 is swung further again in the direction Q in order to have the hooks 112 released from the pins 206 in the way described earlier. Then the point of engagement  
15 of the anchor line 202 203a,b, 204a, b is moved to point 210 at the top of the shank, and the anchor 200 can be pulled out of the ground with a sufficiently oblique position of the anchor line.

20 It will be understood that the coupling mechanism according to the invention as well as its operating means can have a multitude of shapes. By way of example, as shown in figure 8, in an anchor 301 with a fluke 318 and a rigid shank 303 a lever mechanism can be provided, which extends  
25 along the shank to a hindmost point of attachment 311 of the shank on the fluke. The lever mechanism works thus that the swinging in the direction S of the taut anchor line 302 pivots the shackle 305 about pivot pin 306, in which the levers 307 which are fixed with the shackle 305  
30 for pivoting therewith pivot along. The arm 307 is hingably connected to rod 309 by pin 308, which rod slides in the direction T. A coupling, which is not further indicated, is situated at the location of the attachment 311 with which coupling the second coupling member is moved in  
35 relation to the fixed first coupling member with the fluke to uncouple it and to release the attachment 311. The shank 303 then remains connected to the fluke 308 with

16

the foremost hinge connection 310.

5 In many cases the most advantageous approach will be to swing the anchor line in a direction which enlarges the angle with the fluke at uncoupling. It will be understood that it will however also be possible to adapt the coupling such that swinging in the opposite direction is necessary.

10

(AF/NG 4785)

## Claims (amended)

1. Anchor with a fluke with a longitudinal axis which extends from the rear end of the fluke to its front end and with connection means for connecting the fluke with the lower end of an anchor line, which connecting means  
5 comprise an anchor shank, the connecting means comprising at least one coupling with two cooperating coupling members, the first of which being situated on the fluke side of the coupling and being directly or indirectly connected to the fluke in order to follow its movement and the  
10 second being situated on the anchor line side of the coupling and being directly or indirectly connected to the anchor line, the anchor furthermore comprising operation means for the coupling which means are activated by swinging the anchor line held taut in order to change its  
15 angle with respect to the longitudinal axis of the fluke and then to mutually displace the first and second coupling member from a coupling position to a position in which the second coupling member is released or emerges from coupling engagement with the first coupling member,  
20 the second coupling member comprising a coupling hook which can be released by means of manipulation of the anchor line, the first coupling member comprising a pin about which the coupling hook rotatably engages, the operation means being adapted for having the hook pivot  
25 about an axis, which is parallel to and at a distance from the pin, from the coupling position to a release position.
2. Anchor according to claim 1, the coupling being adapted such that after release from the coupling hook the latter  
30 can be entirely lifted away from the pin by pulling the anchor line.

3. Anchor according to claim 1 or 2, the operation means being provided with means for - in the displacement mentioned - urging away the coupling hook from the pin.

5 4. Anchor according to claim 1, 2 or 3, the operation means comprising a first stopping face which is stationary with respect to the pin at least as long as the coupling hook and the pin are coupled to one another, and comprising a second stopping face on the hook integrated  
10 therewith, the first stopping face forming a limitation for the displacement of the second stopping face at pivoting the hook about the pin and therewith forming a fulcrum for the hook.

15 5. Anchor according to claim 4, the second stopping face being at the most 180 degrees in circumferential direction of the hook spaced from the end of the coupling hook.

20 6. Anchor according to claim 4 or 5, the pin being provided with a flattening at the side of the pin facing away from the hook opening.

25 7. Anchor according to any one of the preceding claims, the connection means comprising a second permanent, latently present connection, between the parts of the anchor connected by both coupling members, which connection extends parallel to the coupling formed by the coupling members, and becomes active after releasing the coupling.  
30

8. Anchor according to claim 7, the connection mentioned being a cable or chain.

35 9. Anchor according to claim 7, the connection mentioned being a rigid element which can be extended or folded out.

10. Anchor according to claim 9, the coupling hook being pivotably though permanently attached to the end of an elongated, rigid intermediate member by means of a second

pin, which member at the other end by means of a third pin is pivotably connected to a part of the anchor which forms a rigid whole with the pin, which is situated between the second and the third pivot pin in the coupling position.

5

11. Anchor according to claim 10, the intermediate member comprising a longitudinal slot which is concentrically situated with respect to the pin and in which the second pin is able to slide until abutment, the abutment with the second pin subsequently forming a fulcrum for the coupling hook.

10

12. Anchor according to claim 10, the second pin being fixedly connected to the intermediate member and the hook pivoting about the second pin at uncoupling.

15

13. Anchor according to any one of the preceding claims, the pin forming part of the first coupling member being attached to the fluke and the coupling hook forming part of the second coupling member being attached to the lower end of the shank.

20

14. Anchor according to claim 13, the shank being connected to the fluke with at least two hinge connections spaced in the direction of the longitudinal axis, at least the front hinge connection being constructed as the aforementioned coupling.

25

15. Anchor according to claim 14, the other, rear positioned hinge connection also being constructed as the aforementioned coupling.

30

16. Anchor according to claim 15, the coupling hook forming part of the second coupling member of the front hinge connection being a part of the operation means for the rear hinge connection.

35

17. Anchor according to claim 13, the operation means comprising a lever mechanism which is pivotably mounted on the anchor and being in contact with a portion of the coupling hook which confines the pin forming part of the first coupling member in order to displace it with respect to said pin for releasing said portion.
- 5 18. Anchor according to claim 17, the shank being connected to the fluke with at least two hinge connections spaced in the direction of the longitudinal axis, at least the rear hinge connection being constructed as the aforementioned coupling.
- 10 19. Anchor according to claim 18, the lever mechanism extending from the rear hinge connection along the shank to the upper end thereof and being connected there for co-rotation with a shackle for an installation line.
- 15 20. Anchor according any one of the preceding claims 1-12, the coupling being situated between the shank and the anchor line.
- 20 21. Anchor according to claim 20, the shank being built of elongated elements which extend between the fluke and the anchor line, at least two elongated elements being pivotably attached with their lower ends to the fluke at positions spaced in longitudinal direction and being
- 25 pivotably attached with their upper ends to a first rigid elongated coupling plate on spaced positions, a second rigid elongated coupling plate being hingably connected at one end to the first coupling plate and at a distance thereof forming the coupling with the first coupling
- 30 plate.
22. Anchor according to claim 21, the hinge connection between the two coupling plates coinciding with the connection between the rear elongated element and the first



coupling plate.

23. Anchor according to claim 20, 21 or 22, the shank being provided at the top with a connection for an installation line and of a connection for a mooring or load line, the connection for the installation line being provided with the coupling and the operation means for the coupling being activated by pivoting the load line.

24. Anchor according to claim 23, the operation means comprising a lever mechanism, pivotably arranged on the shank and the first coupling member having a portion, such as a wedge, confining the second coupling member being in contact with the lever mechanism in order to be displaced thereby with respect to the second coupling member for its releasing.

25. Anchor according to claim 20, the shank being rigid and the coupling being provided at the upper end of the shank, the anchor line further being connected with the shank on a location between the fluke and the upper end of the shank by means of a latently present extension.

26. Anchor according to claim 25, said location being at least almost perpendicularly located above the surface centre of gravity of the fluke.

27. Anchor according to claim 25 or 26, the latently present extension being connected to the shank on said location by means of a second coupling.

28. Anchor according to claim 27, either the anchor line or the extension being connected to the upper end of the shank by means of a second latently present extension.

29. Anchor according to any one of the preceding claims, the coupling and the operation means being adapted for

uncoupling in a non-destructive manner.

30. Anchor according to any one of the preceding claims,  
the pivoting of the anchor line for the uncoupling taking  
5 place by enlarging the forwardly opening angle between the  
anchor line and the longitudinal axis of the fluke.

31. Anchor according to any one of the preceding claims, a  
resistance such as a spring being included in the coupling  
10 in order to prevent unintended release when an un-  
controlled swinging of the anchor line occurs.

32. Method for uncoupling a coupling or lock in the con-  
nection between the fluke of an anchor and an anchor line,  
15 the anchor line being swung around in tightened state and  
thereby inducing the uncoupling.

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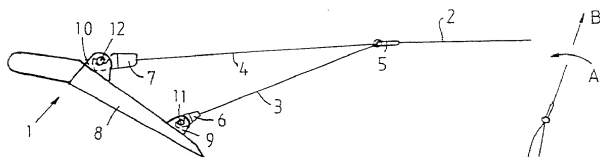


FIG. 1A

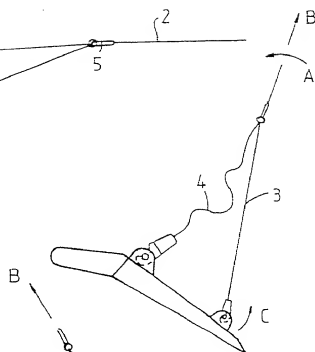


FIG. 1B

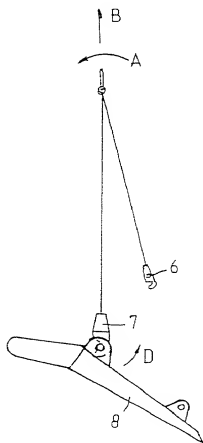


FIG. 1C

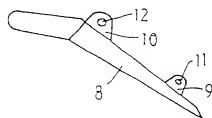


FIG. 1D

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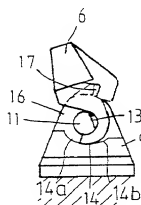


FIG. 2A

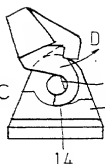


FIG. 2B



FIG. 2C

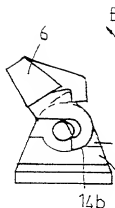


FIG. 2D

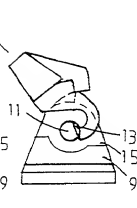


FIG. 2E

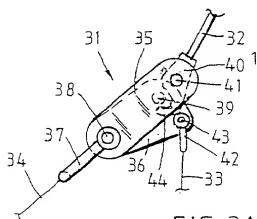


FIG. 3A

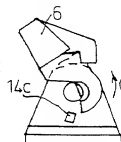


FIG. 2F

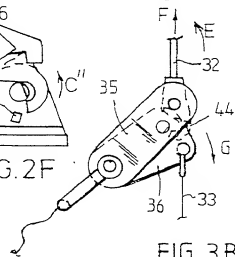


FIG. 3B

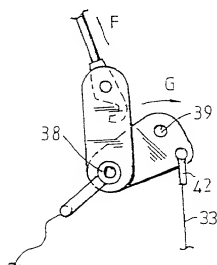


FIG. 3C

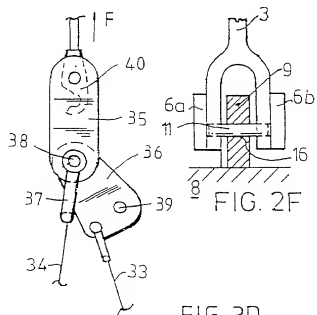


FIG. 3D

FIG. 2F

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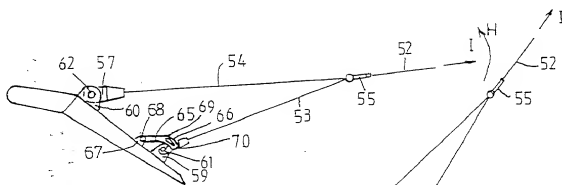


FIG. 4A

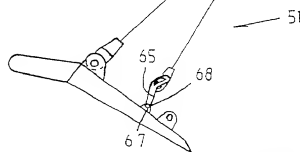


FIG. 4B

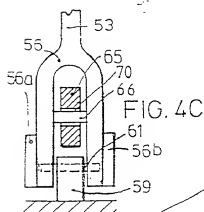


FIG. 4C

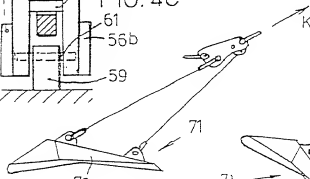


FIG. 5A

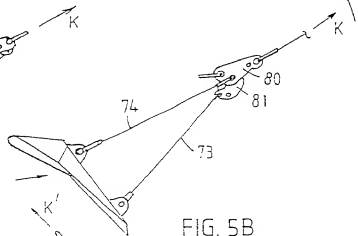


FIG. 5B

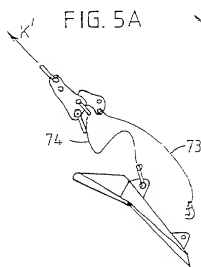


FIG. 5C

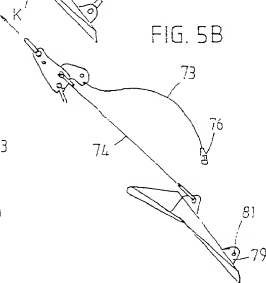


FIG. 5D

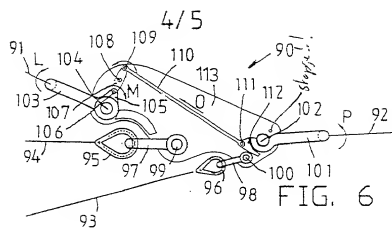


FIG. 7A

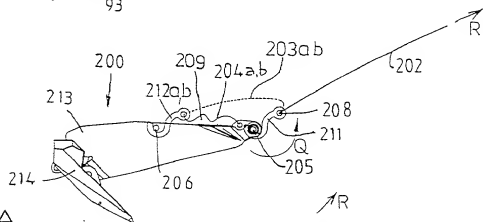


FIG. 7B

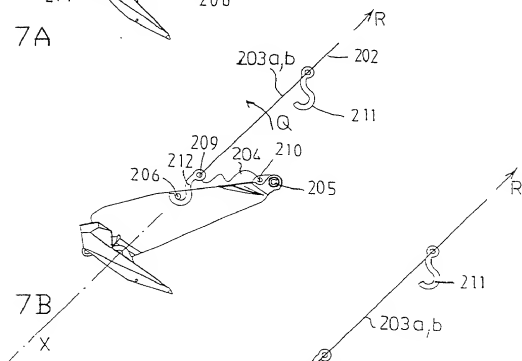
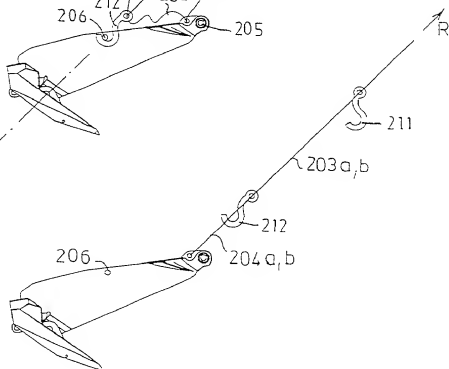


FIG. 7C



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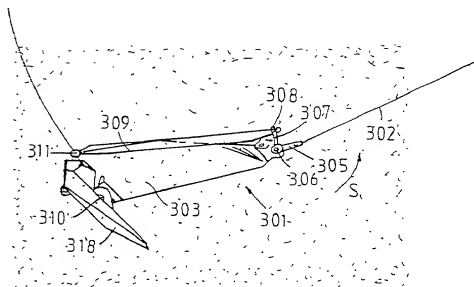


FIG. 8

**DECLARATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or the below named inventors are the original, first and joint inventors (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled ANCHOR AND METHOD OF UNCOUPLING FOR SUCH ANCHOR, the Specification of which:

- ☐ is attached hereto.  
☒ was filed on February 20, 1998 as Application Serial No. PCT/NL98/00102.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability of the subject matter claimed in this application, as "materiality" is defined in Title 37, Code of Federal Regulations, § 1.56.

I hereby claim priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent, United States provisional application(s), or inventor's certificate listed below and have also identified below any foreign application for patent, United States provisional application, or inventor's certificate having a filing date before that of the application on which priority is claimed:

PRIORITY APPLICATION(S)			Priority Claimed
1005353	The Netherlands (NL)	February 24, 1997	Yes
(Number)	(Country)	(Date Filed)	Yes/No
(Number)	(Country)	(Date Filed)	Yes/No

I hereby direct that all correspondence and telephone calls be addressed to Terry D. Morgan, Williams, Morgan & Amerson, P.C., 7676 Hillmont, Suite 250, Houston, Texas 77040, (713) 934-7000.

I HEREBY DECLARE THAT ALL STATEMENTS MADE OF MY OWN KNOWLEDGE ARE TRUE AND THAT ALL STATEMENTS MADE ON INFORMATION AND BELIEF ARE BELIEVED TO BE TRUE; AND FURTHER THAT THESE STATEMENTS WERE MADE WITH THE KNOWLEDGE THAT WILLFUL FALSE STATEMENTS AND THE LIKE SO MADE ARE PUNISHABLE BY FINE OR IMPRISONMENT, OR BOTH, UNDER SECTION 1001 OF TITLE 18 OF THE UNITED STATES CODE AND THAT SUCH WILLFUL FALSE STATEMENTS MAY JEOPARDIZE THE VALIDITY OF THE APPLICATION OR ANY PATENT ISSUED THEREON.



1-80  
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Inventor's Signature:

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Country of Citizenship:

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Residence Address: (street,  
number, city, state, and/or  
country)

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